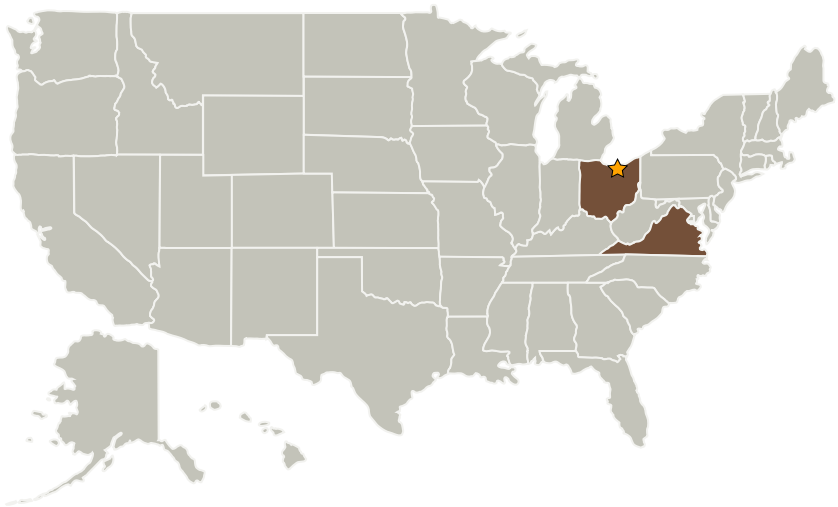
Real-Time Micro-Miniature Dosimeter, Phase I

Completed Technology Project (2006 - 2006)

Project Introduction

The new Presidential directive to place humans on Mars and establish bases on the moon will require advances in nuclear thermal propulsion and power generation. Nuclear thermal propulsion has a combined advantage in power density, ISP and low fuel/mass ratio over other propulsion means for these missions. To meet the needs of reactor safety, health monitoring and performance, light-weight, real-time, in-core neutron and gamma monitoring sensors need to be developed. Luna is proposing to develop a real-time miniature gamma and neutron dosimeter. This hybrid sensor will measure gamma and neutron dose independently, as well as temperature, along a single optical fiber at the same location. The transducer will be less than 5mm long and 1mg in mass. This dosimeter will enable real-time determination of reactor power level, health and remaining fuel as well as shielding effectiveness. The design will be based on EFPI measurement techniques developed by Luna and demonstrated in high-radiation and temperature environments. During the Phase I, Luna will demonstrate feasibility of the proposed dosimeter in a nuclear reactor. Phase II will optimize the sensors and demodulation system for performance and cost, considering space hardening constraints, and demonstrate the system in high radiation and high temperature environments.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Luna Innovations, Inc.	Supporting Organization	Industry	Roanoke, Virginia

Primary U.S. Work Locations	
Ohio	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.4 Advanced Propulsion
    - TX01.4.3 Nuclear Thermal Propulsion